

## CANOPY LIFT SYSTEM

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**General** - the truck canopy was invented many years ago to cover and protect general cargo that was placed in the back of a pick-up truck. It was a great invention, however it created several problems. It limited the availability or usefulness of the front portion of the truck box, as reasonable access was only available to one's reach from the tailgate of the truck box.

There have been many attempts since 1956 to make a truck canopy more efficient in terms of access. Unfortunately, they were very cumbersome, complicated, or most likely not marketable. The key to marketability is simplicity.

### ABSTRACT

Instead of mounting an existing canopy to a truck bed using clamps, this new invention involves the securing of one side of an existing vehicle canopy, with hinges to the upper side of a truck bed, be it a continuous hinge or a series of hinges. This would allow the canopy to lift from a closed or horizontal position to an open or vertical position, and close in the same way. There are a variety of methods in which to lift a hinged canopy to an upright position. The simplest way would be to lift it by hand (if you had a light weight canopy). The most practical and inexpensive way to do this is by a mechanical lift arm powered by a 12VDC linear actuator, which is the basis of this patent application. Power packs that could be used for this purpose are pneumatic and hydraulic, or in combination of the same.

In consideration of the structural integrity of most canopies, the ideal position for placement of a mechanical lift arm and power pack is on top of the inside fender well where the canopy is best balanced.

## **DETAILED DESCRIPTION OF THE INVENTION.**

In reference to Figures 1, and 2, the inside base 1 of a longitudinal side of a vehicle canopy or cover 2 is affixed to the top side of the truck bed 3 by a series of hinges 4 or a continuous hinge, all of which will maintain stability of the cover when lifting, closing, or in the open or closed position. In reference to Figure 1, the top flange of the hinge 4 is secured to the bottom of the canopy or cover side in a safe and appropriate manner. In reference to Figure 2, the end of the bottom flange of hinge 4 is bent at a 90 degree angle downward in order to secure the hinge to the top inside portion of the truck bed. This is done to accommodate a safe and easy method of attaching the canopy or lid to the vehicle.

In reference to Figure 3, the mechanical lift system is comprised of two parts. The first part is comprised of a base plate 5, which is preferably affixed to the top of a vehicle wheel well 6, and an upright arm 7 which is permanently attached to the base plate 5. The upright arm 7 is then attached to the top inside of the truck bed 3 via a moveable plate and sleeve 9 which is attached to the upright arm 7. Again, in reference to the base plate 5, a pivotal point 10 is attached to the base plate to accommodate the base of the power pack 11 used. In addition, the top of the upright arm 7 has also a pivotal point 12.

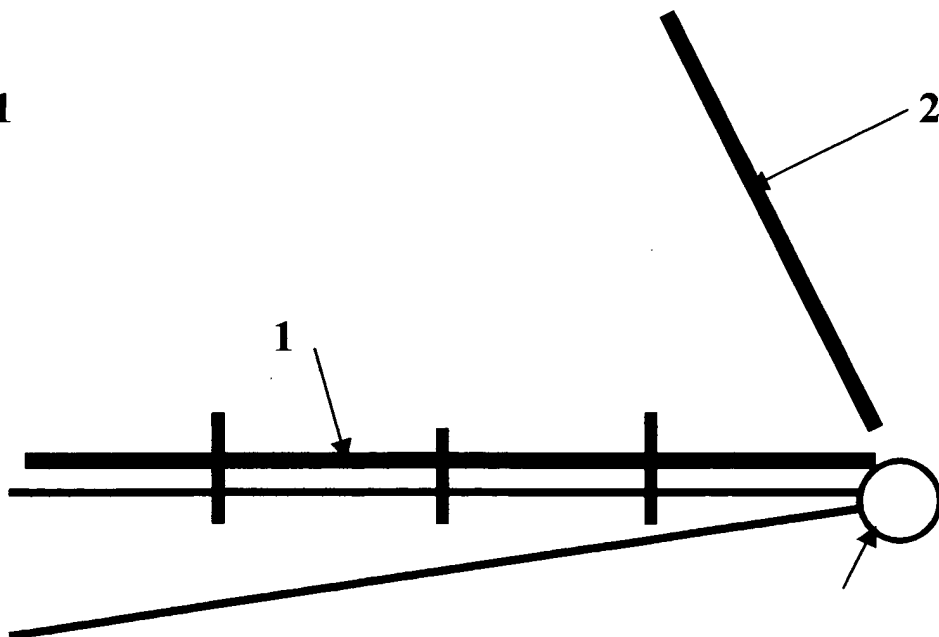
The second part of the mechanical lift system is the lift arm mechanism. Again, in reference to Figure 3, it is comprised of a lift arm 13 that is attached to pivotal point 12, and follows the upward contour of the canopy 2 to the cover ceiling. It then follows adjacent to the canopy ceiling in a parallel manner to the opposite side of the canopy ceiling to pivotal point 14. In addition, the lift arm 13 has a guide arm 15 with a pivotal point 16 at its end. Pivotal point 16 is the connection point for the top end of the power lift 11. Also attached to the guide arm 15, is a support arm 17 which also attaches to the upper portion of the lift arm 13. The lift arm mechanism continues with a down arm 18 connected to pivotal point 14 and follows downward the contour of the canopy side and connects with pivotal point 19 which is on inside base cover plate 20. The inside cover base plate 20 is attached to the canopy inside cover base 21.

A heavy gauge wire (12) should be used to connect the power pack 11 to the vehicle battery through an ON-OFF-ON 3-way toggle (intermittent

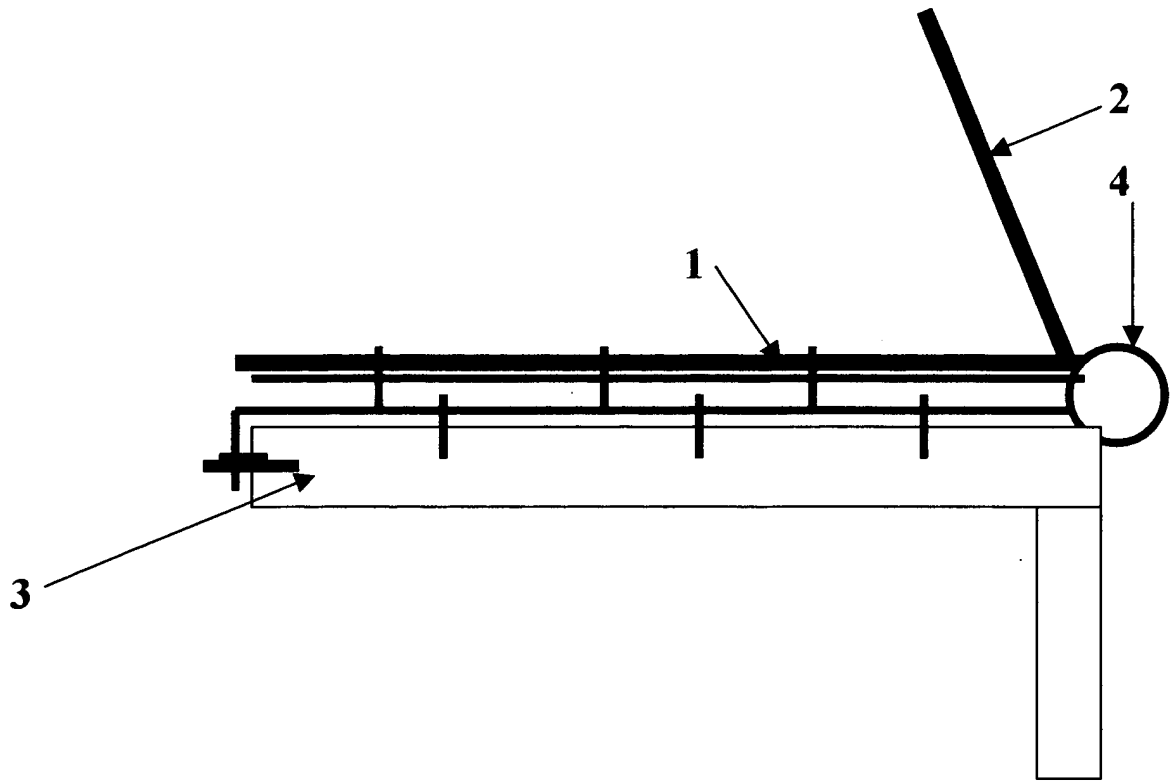
rocker) switch. A 20 amp fuse should be placed on line between the battery and the toggle switch. This switch may be placed where it is most convenient to the customer.

The novel of this operation is the fact that it is simple and uncomplicated. We are using a structure (the canopy) that was intended to be a rigid on a truck box, to be opened and closed at will, thus allowing complete access to the truck bed and free access to all cargo you haul eg: fuel tanks, service lubricants, tools, miscellaneous equipment. When using this lift arm, the canopy is automatically secured while in the down position due to the character of the actuator used.

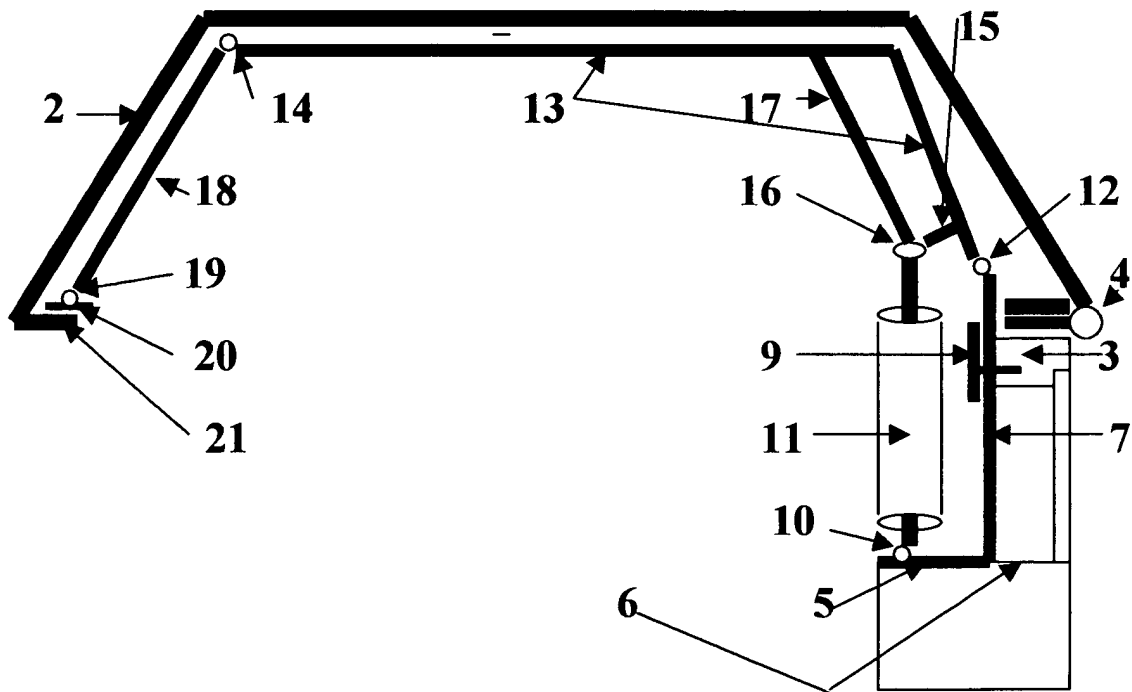
**FIGURE 1**



**FIGURE 2**



**FIGURE 3**



## **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 - is a perspective view of attaching the upper hinge flange to the bottom side of a vehicle canopy or cover.

Figure 2 - is a perspective view of the bottom hinge flange with the end of the flange bent over at a 90 degree angle where it is secured to the top side of the vehicle bed.

Figure 3 - is a perspective view of the complete lift arm and power system as seen attached to the vehicle bed.

## **DESCRIPTION OF PRIOR ART**

A search for prior art includes : U.S. Pat. No 3,578,387 LIFTABLE VEHICLE TOP; No. 3,923,334 TRUCK BODY CLOSURE; No. 3,954,296 VEHICLE BED COVER ASSEMBLY; No. 4,101,162 RAISABLE TOPPER; No. 4,277,098 VERTICALLY SWINGABLE CAMPER SHELL; No. 4,420,181 TRUCK BED CAP STRUCTURE; No. 4,768,824 TRUCK BED COVERING; No. 5,102,185 LOAD BED LIFT ROOF COVER; No. 5,503,450 TRUCK LID LIFT SYSTEM; No. 5,909,921 TRUCK CARGO COVER.

What is claimed is;

1. A mechanical lift system that is primarily designed to open and close an existing vehicle canopy structure by means of hinges and a power lift arm.
2. The invention as claimed in claim 1, includes the securing of one side of any existing vehicle canopy to the upper side of a vehicle bed by means of a continuous hinge or a series of two or more single hinges so the said vehicle canopy may move from a closed horizontal position to an upright open vertical position or vise versa or stop at any position

- between open and closed while at the same time maintaining a secure stability of the said canopy at all times.
3. The invention as claimed in claim 1 is comprised partly, of a lift system which has a base plate and upright arm which is secured to the inside bed of a vehicle usually but not exclusively to the upper part of the wheel well. This positioning is primarily done to give the lift arm a balance of the canopy or cover during lift and close operations.
  4. The invention as claimed in claim 1 is a continuation of claim 3, and is comprised partly, of a lift arm which is pivotally connected to the fixed upright arm and follows the inside contour of the vehicle canopy to the ceiling of said canopy, thence in a horizontal direction close to the canopy ceiling to the opposite side of the canopy.
  5. The invention as claimed in claim 1, is a continuation of claim 4, and is comprised partly, of a down arm, which is pivotally attached to the lift arm at the ceiling of the said canopy and follows the downward contour of the said canopy to its base, where it is pivotally attached to an inside base plate which is secured to the inside base of the vehicle canopy. This is the lift arms contact point for raising and lowering the canopy.
  6. The invention as claimed in claim 1, is comprised partly, of a 12 volt, direct current, linear actuator, which is powered by the said vehicle power system, in which its base is pivotally connected to the top of the base plate and its top is pivotally connected to the lift arm.
  7. The invention as claimed in claim 1, is comprised wholly in accordance with claims 2 to 6.
  8. The invention as claimed in claims 1 and 2, wherein said hinges are of sufficient size and shape and made with sufficient strength such as steel, stainless steel, or other alloys, to maintain the safety and efficiency of the canopy during lifting, closing, or any position in between.
  9. The invention as claimed in claims 3 to 6, is made of plate and tubular steel of sufficient size as not to compromise the integrity or safety of the lift system. Other alloys such as aluminum or stainless steel may be used as long as they conform to all safety and integrity standards.
  10. The invention as claimed in claim 6, has the 12 volt, direct current, linear actuator connected to the vehicle battery via heavy guage wire with an inline 20 ampere fuse near the battery and a reverse polarity intermittent rocker toggle switch located at any convenient position between the linear actuator and vehicle battery. A heavy gauge ground

wire is connected from the vehicle metal to the rocker switch and is continued to the linear actuator. While activated, the linear actuator has equal power to the lift arm in either upward or downward directions. Other power systems considered were hydraulic, electric/hydraulic, and pneumatic.

11. The invention as claimed in claim 1, may be installed on either side of the truck bed so the canopy may lift from any direction the installer desires. The lift system works equally from the left or right installation positions.

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